

**FACTORS INFLUENCING ACCESSIBILITY OF RURAL  
ELECTRIFICATION IN KENYA: A CASE OF NAIVASHA  
CONSTITUENCY**

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**DECLARATION**

This research report is my original work and has not been submitted for a degree to any university.

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## **DEDICATION**

This research project report is dedicated to my late mother, Rebecca Wangari; who, even in death remains a source of inspiration and strength.

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This research project report has been made possible by Prof. David Macharia EBS, my supervisor, who patiently provided guidance right from the start right through to its completion. Many thanks to him.

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## **LIST OF ABBREVIATIONS**

<b>IMF</b>	International Monetary Fund
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KPLC</b>	Kenya Power and Lighting Company
<b>MENR</b>	Ministry of Environment and Natural Resources
<b>MoE</b>	Ministry of Energy
<b>REA</b>	Rural Electrification Authority
<b>REP</b>	Rural Electrification Programme
<b>LEPLF</b>	Rural Electrification Programme Levy Fund
<b>SSA</b>	Sub Saharan Africa
<b>SE4ALL</b>	Sustainable Energy for All

## ABSTRACT

The World Bank Study on the Welfare Impact of Rural Electrification (2008) spells out the importance of electricity access in rural areas. The benefits of rural electrification range from lighting, access to information, improved study environment for school children as well as improved businesses which in turn create employment opportunities and contribute to development and poverty reduction. Kenya's ability to achieve its Vision 2030 is hinged, among other variables, on the country's ability to increase access and supply of electricity to its population. To this end, the government established the Rural Electrification Authority to advance this agenda. Rural Electrification Authority has been operational since 2004 but despite the level of funding it receives from taxes levied on electricity consumers, access to electricity in the rural areas stands at a dismal 3.8%. This study seeks to examine the factors influencing accessibility of rural electrification in Kenya, with a specific focus on Naivasha Constituency. The study focuses influence of the performance of the Rural Electrification Authority, as the supply side of rural electrification; the influence of demand for electricity by Naivasha residents as the demand side and the role of alternative power sources. The study adopted a survey design and focused on the Rural Electrification Authority projects Naivasha. The target population was 2,159, made up of 1,670 households, 430 business community members, 20 churches, 13 public primary schools, 14 public secondary schools and 12 members of the management team of the Rural Electrification Authority. Data was collected from a sample size of 221, representing about 10% of the target population. The data was analysed using thematic and content analysis. The study found that the Rural Electrification Authority has adequate policies to facilitate its performance on the provision of rural electrification but lacks sufficient funding. The study found that monitoring is not conducted on a continuous basis and public participation was found to be lacking. The study also found that demand for electricity has been rising due to people's ability to pay due to improved incomes generated from employment and small business enterprises. The study found that majority of the residents are aware of the alternative power sources available, e.g. solar and biogas which are relatively cheaper to install and more reliable in comparison to grid connection. The study recommends that the Rural Electrification Authority endeavours to include community participation in their projects to enhance community ownership and ensure sustainability. In addition, the Rural Electrification Authority needs to ensure they have the skills needed for community mobilisation and public relations. It is also recommended that the Rural Electrification Authority builds in continuous monitoring as an integral part of their projects and that lessons learnt are properly documented and used to inform future projects. The report also recommends that the Government supports and provides incentives for investments in alternative power sources to complement the efforts of the Rural Electrification Authority as this will not only increase accessibility to rural electrification but also promote the use of renewable energy as opposed to fossil fuelled energy.

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

According to the World Bank (2008), there are numerous benefits derived from rural electrification that contribute to improving the quality of life in the rural areas. Apart from lighting which improves the study environment for school children, electricity also improves businesses, thereby providing employment opportunities, hence contributing to poverty reduction. Access to electricity also allows access to information and entertainment by making it possible for people to own televisions. The study reports that the dominant use of electricity in rural households is lighting. The next most common use is Television (TV) and both lighting and TV account for at least 80% of rural electricity consumption, which forms the bulk of the benefits delivered by electrification.

The importance of rural electrification in Kenya is spelt out in the Government's Sessional Paper Number 4 on Energy (May 2004). The Paper sought to lay the foundation upon which cost-effective, affordable and adequate quality energy sources will be made available on a sustainable basis. This Paper led to the creation of the Rural Electrification Authority (REA), which was established and charged with the responsibility of accelerating the pace of rural electrification in the country.

In the case of domestic consumers in developing countries, affordability is a key obstacle to the ability to obtain reliable modern energy, especially for those living in rural areas who are often poor and vulnerable. As a result, such communities are heavily dependent

on the continued use of traditional fuel sources, including: firewood, charcoal, kerosene and farm residues, for their lighting, cooking and heating.

The electricity industry involves a complex system where economic, technical, institutional, financial, social, political and environmental factors interact to influence the demands of the different consumers. Among all these factors, the institutions for the delivery of electricity services and the provision of reliable services particularly to household customers probably exert the greatest effect on this industry. Moreover, amongst these institutions, governments play a major role as they are responsible for establishing policy in the form of new laws and regulations that promote, accelerate or improve electricity services amongst their citizens. In particular, when a government seeks to promote access to renewable energy sources it needs to promote policies that take into account such matters as: affordability, disposable income, availability and high quality of modern sources (Barnes *et al.*, 2005).

Like any other kind of project, rural electrification projects in Kenya have had a share of both successes and failures which can largely be attributed to a number of factors. This study seeks to explore factors influencing the accessibility of rural electrification in Kenya, with a focus on rural electrification projects in Naivasha.

A project is considered successful if it is delivered on schedule and acceptable quality. However, measuring project success is not an easy task since success is intangible and can hardly be agreed upon (Xiao & Proverbs, 2008). Usually, project success is defined

as the overall achievement of project goals and expectations. The general concept of project successes yet to be clearly defined because of varying perceptions where different individuals have different perspectives. There are differences of opinions among stakeholders regarding what is critical to project success, what is measured during project phases and what the project priorities were (Chua &Loh, 2007).

## **1.2 Statement of the Problem**

Electrification in Kenya is below the SSA average with 15.8% overall access and only 3.8% access in rural areas. This is despite the establishment of the REA and the significant financing it receives, and other initiatives such as the *Umeme Pamoja*, a programme launched in 2006/07 with the aim of getting groups of rural households collectively connected to the grid.

This low coverage is also in contrast with Vision 2030 where the government recognizes that the vision can only be achieved if citizens have access to electricity, including the rural areas. However, high connection costs and low incomes among rural households are some of the challenges facing rural electrification (KPLC, 2006).

All electricity consumers pay a 5% levy that goes towards the Rural Electrification Programme (REP). However, despite this substantial source of income, the REP has not been able to increase the total electricity coverage in a proportionate manner. Despite the REP cutting across all regions and constituencies in Kenya, there are areas that are more connected with electricity than others. For example, Nairobi County has a high electrification rate of 72% in spite of the limited naturally occurring energy potential.

Tana River County, on the other hand, has a low electrification rate of 2.5% despite hosting more than 75% of the hydro power generation capacity in the country.

Kenya, with a total population of over 41million, has a significant low level of electricity supply, standing at 1500 Megawatt hour (MWh) compared to Finland with a population of around 5.5M but with energy supply of 400,000 MW (Abdulla and Markandya, 2007). Another comparison can be made with California which has a population of 38 million that is comparable to that of Kenya. But the comparison ends there because California has 41MW installed for every 1MW of Kenya's electricity powering. Indeed, California uses more electric energy than any combination of 35 Sub-Saharan Africa countries, excluding South Africa, whose access to electricity increased from 35% of households in 1990 to 84% in 2011. Connection charges for poor households in South Africa are minimal and in many municipalities, these charges can be paid in instalments. When the government realised that poor households could not afford to use electricity, Free Basic Electricity (FBE) was introduced in 2004. On the other hand, Ghana had over 72% electrification in 2010, with a target of 100% coverage by 2020.

It is against this backdrop that this study aims to investigate factors influencing accessibility of rural electrification in Kenya by examining Naivasha Constituency. Naivasha Constituency is among the constituencies with significant rural electrification coverage across the country. Naivasha has significant operating environment challenges emerging from the political interference leading to stalled projects. Despite the significant

coverage by rural electrification programmes, there are significant challenges to the access of electricity.

### **1.3 Purpose of the Study**

The purpose of this study is to examine factors influencing accessibility of rural electrification in Kenya: a case of Naivasha Constituency.

### **1.4 Objectives of the Study**

The objectives of this study are:

- i. To assess the influence of REA's performance on the accessibility of rural electrification in Naivasha Constituency, Kenya.
- ii. To establish the influence of demand for electricity on the accessibility of rural electrification in Naivasha Constituency, Kenya.
- iii. To determine how alternative power sources influence accessibility of rural electrification in Naivasha Constituency, Kenya

### **1.5 Research Questions**

This study seeks to answer the following questions

- i. What is the influence of REA's performance on the accessibility of rural electrification projects in Naivasha Constituency, Kenya?
- ii. How does demand for electricity influence the accessibility of rural electrification in Naivasha Constituency, Kenya?
- iii. How do alternative power sources influence accessibility of rural electrification in Naivasha Constituency, Kenya?



### **1.6 Significance of the Study**

This research study is of great benefit to the implementers of rural electrification projects as well as other players and stakeholders in the electricity and energy industry. To the Rural Electrification Authority (REA), the study provides information that can be used in the formulation of policies and application in relation to the area context. The findings of this study can also be used by the government and Ministry of Energy to promote the rural electrification program (REP) projects in rural and urban areas and ensure their completion by acting on the recommendations.

The findings are also being important to academics and researchers as a basis for further researches. The study provides the background information to research organizations and scholars who may want to carry out further research in this area.

### **1.7 Limitations of the Study**

The study was limited to Naivasha constituency and its findings may not be generalized since it is not a significant representation of all the constituencies in Kenya. The study was also limited by the magnitude of the area and the resources required to cover the area, especially in terms of financial resources.

### **1.8 Delimitations of the Study**

This study looked at electrification in Kenya, using Naivasha as a case, and targeting 221 respondents within Naivasha, a Constituency ranked among those with significant rural electrification coverage across the country.

## **1.9 Assumptions of the Study**

The researcher assumed that the respondents would be willing to participate in the study and that they would also exercise honesty and provide accurate information.

## **1.10 Definition of Significant Terms**

Below are the definitions of terms used in the study:

**Accessibility of rural electrification:** This is the state and ease of being able to be connected to the electrification grid and the availability of opportunities for connection on the basis of need.

**REA's performance:** This is the quality of the overall progress and general sustainability of REA's projects, including adequacy of REA policies, REA's capacity, finances, and operating environment of the supply side of rural electrification

**Demand for electricity:** This is the act of strongly asking for electricity and with determination to be connected as a right, based on people's need and awareness, as well as their ability and willingness to pay.

**Alternative Power sources:** These are methods by which people are able to obtain energy without necessarily being connected to the national electricity grid, for

example solar power, bio energy etc., and which may be preferred due to their relative affordability, availability and reliability.

### **1.11 Organization of the Study**

This study sought to explore the factors attributable to accessibility of rural electrification in Kenya. The study is organized in five chapters. Chapter one is the introduction that provides the background to the study. Chapter Two looks at available literature on rural electrification from global, African and Kenyan perspectives. Chapter Three explains the research methodology adopted for the study. The data from the field are analysed, presented in terms of tables and interpreted in Chapter Four and the summary of key findings, conclusion and recommendations are found in Chapter Five of the study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews literature on rural electrification from global, African and Kenyan perspective. It also presents relevant theories and finally offers a conceptual framework on which the study is based.

#### **2.2 Accessibility of rural electrification**

Accessibility to rural electrification is facilitated through the implementation of rural electrification projects (REPs). A great deal of research efforts have been made to determine the factors that influence project performance. Pinto and Slevin (2008) have made major contributions in identifying and examining critical performance and success factors. Maloney (2008) conducted a study on evaluation of project performance in terms of time, cost and quality in determining whether project objectives are met. However, achieving success in completing a project should be something much more important than simply meeting cost, schedule and performance specifications. Parfitt & Sanvido (2006) in their research suggested that the goals and expectations relate to a variety of elements including technical, financial, educational, social, and professional issues.

Jaselskis and Ashley (2005), Sanvido et al (2008) and Chua and Loh (2007) have conducted research to identify critical success factors for project success using quantities of measures of various factors. Their studies revealed that the impact of experience possessed by project key personnel is important for project success. In a different research by Freeman and Beale (2002) and Riggs (2002) suggested that project

success criteria should be recognized from respective viewpoints of different project participants. Xiao and Proverbs (2008) suggested that to improve contractor performance, a contractor is advised to focus on construction time, reduce delays, maintain stable workforce and establish partnership with subcontractors. Another research conducted by Xiao and Ling (2006) identified insufficient communication, adhering to mutual goals; empowering staff with authority; excessive demands from partners; and involving contractors in the project early as factors that are key to project implementation in China.

The electricity industry is made up of a complex system where different factors interact to influence the demands of the different consumers. Key among these factors is the institutions for the delivery of electricity services and the provision of reliable services particularly to household customers, which probably exert the greatest effect on this industry. Country governments also play a major role as they are responsible for establishing policy in the form of new laws and regulations that promote, accelerate or improve electricity services amongst their citizens.

### **2.2.1 Accessibility of Rural Electrification in Africa**

In developing countries, affordability is a key obstacle to the ability to obtain reliable modern energy, especially for the poor living in rural areas. As a result, such communities are heavily dependent on the continued use of traditional fuel sources like kerosene, firewood, charcoal and farm residues, for their lighting, cooking and heating. According to Kebede (2006) rural households in Ethiopian not only have limited access to modern energy sources, but also incur high expenditures on traditional fuel sources.

Most developing countries include rural electrification policies in their socio-political development efforts. The existing economic inequalities between urban and rural populations and these countries' social equity objectives tend to be the main drivers of providing electricity access to isolated populations. By doing this, governments of developing countries seek to improve the living standards of their rural populations and help them economically in order to help level out rural/urban disparities. Indeed, substantial upfront costs and long-term financial investments are required to accelerate the pace of rural electrification. Such financial security depends on government support.

In other developing countries the subsidization policies vary according to governments objectives, with regard to REP targets. For example, in the case of South Africa, the National rural electrification project aims to meet the needs of households, institutions of learning and health centers, based on the impact analysis of the rural electrification in various sectors in rural areas (Thom, 1998). In Uganda, rural electrification is carried out through the utility private providers who are faced with insufficient supply of generation that is not equal to demand. As a result of market failures, rural electricity connection is high and private distribution companies are forced to load-shed by selectively cutting off power to some consumers, leading to unreliable power supply in rural areas (Ezor, 2012). However, there have been other cases where subsidies have disproportionately been allocated, such as Malawi, where the urban households have been subsidized at US\$ 300 compared to rural households getting US\$ 60 (Gustavsson & Ellegard, 2005).

### **2.2.2 Accessibility of Rural Electrification in Kenya**

Globally, 1,456 billion people have no access to electricity of which 83% are in rural areas. This is no exception in Kenya where majority of people in rural areas have no access to electricity and rely heavily on wood for cooking, which has adverse effects related to indoor pollution and health complications. Collecting firewood too takes a lot of time which mainly affects girl education as girls are the ones who usually collect firewood. In Sub Saharan Africa 12% of rural population have electricity which is far less than the 35.4% average access of developing countries worldwide (Kenya national energy policy 2012).

Kenya's efforts towards rural electrification are stipulated in the Government's Sessional Paper Number 4 on Energy (May 2004). This is the paper that laid the foundation for the formation of the Rural Electrification Authority (REA), which was charged with the responsibility of accelerating the pace of rural electrification in the country and ensure that affordable, cost-effective and adequate quality energy sources are made available on a sustainable basis.

REA was established in 2007 under Section 66 of the Energy Act of 2006 with the principal mandate of extending electricity supply to rural areas, managing the rural electrification fund, mobilizing resources for rural electrification and promoting the development and use of renewable energy (MoE, 2013). In Kenya, therefore, rural electrification projects are mainly undertaken by the REA, though some works are carried out by Kenya Power & Lighting Company (KPLC), which also connects customers and operates and maintains the national grid. The objective of the REP, which is financed by

the government, is to provide electricity in areas that are far from the national grid, and where electricity supply projects are not commercially viable, with a view to improving the social and economic lives of Kenyans in those areas.

In 2010/2011, the government, through KPLC and REA implemented a total of 1,033 projects spread across constituencies, projects which benefitted 734 market centers, 535 public schools, 34 polytechnics, 177 health centers, 44 government centers, 31 coffee factories, 75 tea-buying centers and 127 water projects among others. However, despite all these efforts, electricity access and connectivity rates still remain low in rural Kenya. One reason for this low level of electrification in rural areas is the lack of finance to cover capital and operating costs for generation, transmission and distribution of electricity, which are all higher than in urban areas.

A study by Sabah Abdullah and Anil Markandya, (2007) on rural electrification programmes (REP) in Kenya indicates that the program has faced setbacks due to high connection costs. The willingness to pay (WTP) to be connected to the grid and photovoltaic services is less due to the high cost which the government needs to deal with through reforming the energy sector by giving subsidies.

The Kenya overall electrification rate in rural area is 14% which far below the sub Saharan Africa level of 23 % (Abdullah, 2007). Lack of enough capital in rural areas has led to poor electrification as the cost increases with distance from the grid, which makes connection cost in urban areas cheaper than in rural areas. The low consumption of



electricity in rural areas and low income makes extension of grid to those areas uneconomical. In Kenya wood fuel provides up to 70% of the energy sector except for transport and commercial purposes. This has led to high indoor air pollution (IAP) (Abdullah, 2007).

Other challenges facing the energy sector in Kenya is quantity, quality and reliability of energy supply, high initial capital outlay, and long lead times from feasibility studies to development of energy infrastructure, mobilizing adequate financial resources to undertake investment in the power sector and high cost of energy, low per capita incomes and the low level of industrialization. Challenges of institutional arrangements; governance issues, lack of research institutes, funding constraints and inadequate human resources capacity and overlap of mandate of various institutions (Kenya national energy policy 2012).

Moreover, the high connection costs coupled with low consumption of electricity and low incomes among rural households are additional obstacles to electrification. As such, over 70% of Kenya's total energy consumption is derived from wood based sources and more than 93% of rural households depend on this source (Ministry of Environment and Natural Resource (MENR), 2005). This has environmental implications that render it unsustainable.

Naivasha constituency is significant beneficiary of the rural electrification programme. As a result of the rural electrification, there are significant socio-economic activities in

the constituency. Some of the rural populations are able to irrigate their small scale farming, poultry keeping among other economic activities. There are a number of challenges to the smooth achievement of the rural electrification. These include power line management, vandalism and distribution of transformers (Brian, 2013). Power supply disruptions caused by the transformer vandalism have become very difficult to predict hence difficult to control. A lot of resources have been put in place in engaging security services leading to a lot of arrests but the syndicates appear difficult to dismantle due to weak legislation and the law enforcers have no capacity or knowledge to understand the socio-economical implication of theft and vandalism (Ibid).

### **2.2.3 Influence of REA's performance on accessibility of rural electrification in Naivasha**

The supply side of rural electrification comprises of the institutions for the delivery of electricity services, largely the Rural Electrification Authority and the Kenya Power and Lighting Company. The market for rural electrification comprise of complex system that consist of economic, technical, financial, institutional, social, environmental and political factors that influence the demands of the different consumers. Amongst all these factors, the institutions for the delivery of electricity services and the provision of finance to customers greatly affect these markets. When a government policy seeks to promote access to renewable energy sources, it needs to influence factors such as: affordability, disposable income, availability and high quality of modern sources. (Barnes *et al.* 2005). In the case of the residential sector, affordability is particularly considered to be one of the main obstacles to the adoption of modern energy.

There have been a number of different policy programmes initiated by the government together with other key institutions like the Kenya Power & Lighting Company (KPLC), to increase rural electrification across the country. One of the key areas has been the rural electrification programme (REP) established in the early 1970's. The REP funds are obtained from a 5% levy, namely the rural electrification programme levy fund (REPLF), which is charged to all electricity users nationwide. The REPLF is one of seven decentralized operational funds in Kenya aimed at alleviating socio-economic disparities at the local level.

Another initiative promoting electricity access in the rural areas is “*Umeme Pamoja*”, which translates as “Electricity Together”. This campaign seeks to establish a joint group of households, so as to connect them collectively to the grid, thus saving costs. This scheme is financed by the group settlement electrification schemes created by the KPLC. According to them, this scheme is aimed at making electricity connection easier, affordable and faster (KPLC 2006).

The REP cost in Kenya has been estimated to be between US \$ 25 to US\$ 40 per kWh, compared with an amortized life-cycle cost of US\$ 1 to US\$ 2 per kWh for solar and battery operated systems (Jacobson 2005). The World Bank (1995) report argues that, only 10 to 40% of the economic cost of REPs is recovered from the users; meaning the programmes need to be heavily subsidised by the government. About 60% of the REPLF finances new grid-extensions, with the rest being spent on operation and maintenance (Aligula *et al.* 2006). Furthermore, Kenya's REP has been handicapped by financial

burdens (Kenya Integrated Household Budget Survey (KIHBS 2007). According to Eberhard and Gratwick (2005) the greatest challenge for energy market in Kenya is the sustainable balance between investment and supply. Indeed, investment through greater involvement of new providers including the private sector remains an arduous task.

#### **2.2.4 Finances for rural electrification projects**

Most REP policy makers have limited resource mobilization skills and are often not looking for funds that are available locally, preferring to wait for international donors to approach them. There is a high dependency of donors and a tendency to shift interventions to match donor priorities (Renz, 2010).

It is important to have a financing strategy with several different sources of income as opposed to relying on just one or two donors as this carries the risk of having all the eggs in one basket. Having multiple sources of funds allows flexibility and a REP can choose and change the projects it wants to run and can cover costs that donors are reluctant to fund (Chowdhury, 2008).

Building up reserves is another way of developing financial stability and has a number of obvious advantages for REPs. It reduces dependence on donors, helps during cash-flow shortages and helps to withstand financial shocks and unplanned expenditure (Fin access, 2007).

The budgeting process and the ongoing management of cash and other assets are two strategic financial management areas of focus for organizations. This focus is dictated by

the overarching stewardship obligations of a charitable organization that receives money from the public to meet a perceived societal need. These organizations must therefore pay close attention to whether they have enough cash reserves to continue to provide services to its customers. Cash flow can be extremely challenging to predict, because these organizations rely on revenue from resource providers (donors) that do not expect to receive the service provided (Carmona, 2008). In fact, an increase in demand for services can lead to a management crisis. It is difficult to forecast contribution revenue in a reliable manner from year to year. For that reason, the control of expenses is an area of increased emphasis (Kurosaki, 2003).

Financial strategies for self-sustenance are one of the most important practices that an organization can be skilled in. With the challenges of accountability regulations and dwindling donor support facing today's non-profit making organizations like REPs, an understanding of the strategic financial management practices can help to ensure that an organization is fiscally stable and sustainable (Barrett, Bezuneh & Reardon, 2006). This is especially applicable to external financing instruments that support rural projects but do not provide funds after the project termination. It therefore becomes imperative to plan ahead how the costs of the post-implementation activities will be covered (Baland & Platteau, 2008). One option is to cover the costs through beneficiaries' contribution, in case there is a component of cost-recovery through end-user's services. In this case, it is important that the service fees cover the costs of follow-up activities.

### **2.2.5 Monitoring of rural electrification projects**

Despite the importance of internal follow-up and monitoring of completed projects to ensure sustainability of rural projects initiatives, it is usually a neglected component in the planning process. Follow-up is part of the monitoring and evaluation phase, which is carried out together with the stakeholders and end-beneficiaries, but it is the ultimate responsibility of the implementing agency or organization. Here, key information is found on how to supervise implemented projects in a simple and effective way, and how to take advantages of the lessons learned from past experiences for the design of related projects (Ostrom, 2008).

Although it is extremely important, the monitoring phase is often neglected. This is the phase that puts in place arrangements to ensure sustainability after the project completion (Baars, 2006). For example, a water service is sustainable when it is functioning and being used; it is able to deliver an appropriate level of benefits (quality, quantity, convenience, continuity, health) to all, including the poorest women and men; it continues to function over a prolonged period of time (which goes beyond the life span of the original equipment); its management is institutionalized; its operation, maintenance, administrative and replacement costs are covered at the local level; it can be operated and maintained (O&M) at local level with limited but feasible external support; and it does not affect the environment negatively (IRC, 2004). Therefore, in order to ensure sustainability of rural projects, it is imperative to include an internal monitoring process. This complements the participatory monitoring and evaluation component done in cooperation with the end-beneficiaries, but gives the responsibility to the implementers and initiators of the project to keep an eye on what has been done.

Monitoring requires that management maintains decision-making flexibility and promote an adaptive management approach. Feedback from follow-up programmes provides opportunities for project managers and regulatory agencies to respond when changes in an activity, in the environment or in the social-political context call for an adaptation of current practices. Many activities involved in projects might be based on scientific methods. Some follow-up activities evaluate the utility and effectiveness of these tasks. Monitoring will allow the better understanding of new technologies and approaches, which may result in improving the quality of measures or techniques, used in future projects. On-going follow-up programmes may improve public awareness about the actual effects of development projects, leading to improved public acceptance of proposals (Batchelor et al, 2000).

Monitoring is a key mechanism for feedback. It allows learning from the experiences of previous projects and allows sharing these outcomes with the development and scientific community. In particular, without some form of follow-up, the benefits of the projects and the outcomes will remain unknown. By incorporating feedback into the planning process, follow-up assesses the impact and thereby enables learning from experience to occur. Through activities such as monitoring and evaluation, follow-up provides concrete evidence of outcomes (Arts, 2004). This knowledge can be utilized by the implementers or other agencies alike to improve future projects. Subsequent projects are to some extent easier to carry out, as they build on previous experiences. During the planning of subsequent projects, it is necessary to include the lessons from the previous projects, based on the findings in the follow-up processes (Sansom et al., 2001).

Follow-up provides the missing link between planning and continued project implementation. It links the pre- and post- decision stages of planning, thereby overcoming the gaps that arise when there is a difference between project plans and their implementation. Follow-up not only provides information about the benefits of a project, but it also gives the agencies the opportunities to implement measures to mitigate or prevent negative effects.

The most important issue to take care of is to assign completed projects to staff members, preferably those with monitoring and evaluation skills. It is essential to instill a sense of ownership among team members, especially of those projects which are completed. Otherwise, the implemented projects will be forgotten when new ones start (Huby & Stevenson, 2010).

### **2.2.6 Operating Environment of the rural electrification projects**

The Kenya government has made efforts to create an enabling environment for development by improving infrastructure (roads, electricity, IT, communications, water, market access) which provide opportunities to poor people and their communities (International Monetary Fund (IMF), 2008).

The government is also enhancing the performance of its line Ministries, who are now all on performance contracts and technical personnel are now willing to partner with REPs. However, few REPs have strategic plans which would enable them to have ownership over their mission, values and activities. This leaves them vulnerable to the whims of donors and makes it difficult to measure their impact over time (Baumann et al, 2005). In



some regions, in particular South Rift and North Eastern, REP leaders cite the interference of local politicians and civic leaders as a major hindrance to their work. This scenario would imply that risk mapping needs to be instilled as part of the project design process. Sustainable strategies for remote areas and areas with diverse groups need a risk management lens to identify what kinds of risk management capacity needs to be in place at the household and community level, what types of safety nets need to be available at various levels in case local capacity to manage risk becomes overwhelmed.

By their very nature and not unreasonably, many project grants focus on project output rather than general organizational development. Additional activities such as training can be viewed by donors and REPs alike as taking funds from programme activities. The value added by capacity building is usually harder to measure and therefore tends to enjoy less support. REPs recognize that many of them have limited technical and organizational capacity. Few REPs are able or willing to pay for such capacity building. Weak capacity is identified in fundraising, governance, technical areas of development, and leadership and management. Some REPs feel that the existence of quality standards would assist them to develop the required capacities. The speed of technology changes is also a challenge particularly in areas of IT capacity (Chapman et al, 2006).

### **2.3 Influence of Demand for Electricity on accessibility of rural electrification in Naivasha**

Rural households, not only have limited access to modern energy sources at reasonable rates, but also incur high expenditures on traditional fuel sources and this compounds the problem of affordability of household fuels. For both electrified and non-electrified

households, the three fuel sources: firewood, charcoal and kerosene represent a major proportion of their usage. Some use solar energy. However, in comparative terms these three fuel sources take up 98% of the non-electrified total energy expenses, whereas the figure is 65% for their electrified counterparts. This means that the non-electrified households are spending considerably more on these traditional fuels than electrified households. One way of reducing the consumption of these fuels by the non-electrified is to provide them with electricity (Eberhard and Gratwick 2005).

Naivasha Constituency is an electoral constituency in Kenya. It is one of the 11 constituencies in Nakuru County with a population of 224,141 and the constituency covers an area of approximately 1,685.80 square kilometres (Kenya Bureau of Statistics, 2009). Prior to the 2012 split of the constituency, it had a total of 3,496 rural households connected to electricity under the rural electrification programme (Ibid). After the split, the constituency now has 1,679 households connected to electricity with other alternative sources of energy as follows; fuel wood at 230, solar at 879, gas lamp at 65, tin lamp at 6,017, lantern lamp at 7,897 and pressure lamp at 73. Naivasha constituency has 431 businesses (shop keeping, hardware, kiosks, welding, carpentry and poultry) that are beneficiaries of rural electrification programme. There are three rural public primary schools, out of which two are beneficiaries of rural electrification programme. The constituency has three rural public secondary schools, all beneficiaries of rural electrification programme. There are twenty one registered churches. Out of the twenty one churches, fourteen are beneficiaries of the rural electrification programme, while the rest use alternative sources of energy.

## **2.4 Influence of Alternative Power Sources on accessibility of rural electrification in Naivasha**

The national energy policy of 2012 indicates that the peak load in Kenya is to grow to 2511MW by 2015 and later to 15026Mw by 2030. As at June 2011 only 28.9% of Kenya's total population was connected to electricity, an increase from 15% in April 2004. This shows a growing population but without a growing energy provision (Kenya national energy policy 2012).

By 2030 the government projections according to economic survey report 2011 Kenya is to produce nuclear energy 19%, geothermal 26%, coal 13%, hydro 5%, thermal 9%, gas turbine (LPG) 11% wind 9% and import 8% and this should help to generate the 15026 which will be required by 2030 as shown in Table 2.1 :

**Table 2.1 Source of Energy productions as in 2011 and the production expected by 2030**

	<b>2011</b>	<b>2030</b>
Geothermal	12.4%	26%
Nuclear	---	19%
Fossil	37%	-----
Coal	-----	13%
Wind	0.3	9%
Solar	-----	---
Hydro	47%	5%
Liquefied petroleum gas	2.4	11%

Source: Kenya National Energy Policy (2012).

Kenya is endowed with a significant amount of alternative power sources. Besides the ones mentioned in table 1.2, others include biomass and biogas. Out of the above mentioned power sources, Solar and wind are readily available with significant access of both rural and urban population (Jacobson, 2004).

The affordability of the alternative sources of power is linked to the economic income of the population. In the upcountry, most people are able to afford biomass energy that is derived from woodlands, farm lands, bush lands, closed forests, plantations, industrial and agricultural residues (Ibid). The forests provide over 45% of the biomass energy that is the largest means of alternative energy used in Kenya - both rural and urban areas. Solar and wind are also affordable compared to other sources of power like nuclear, fossil, coal, hydro and liquefied petroleum gas. A small section of the population uses hydro power and diesel fueled power (Ibid).

The reliability of the alternative sources of power is based on the individual source of power. Hydro and diesel fueled power are unreliable because of the availability of diesel fuel in some areas where there is scarcity of fuel and hoarding by the dealers awaiting price increase to maximize profit. The wear and tear of the diesel generators affects its reliability. Biomass energy, solar and wind are reliable for a significant number of people across the country. It has got less of other related costs compared to the diesel fuel generators (KIPPRA, 2007). Preference to most of the people is the biomass and solar. The availability of trees especially in rural areas motivates people to use the biomass

energy sources like wood. Solar is readily available in the country with minimal related costs for buying solar panels (Ibid).

Strategies are therefore needed to help rural people afford alternative sources of energy. To this end, the government is working with the World Bank and other donors on a programme aimed at promoting the use of solar and wind energy which will ensure some sustainable supply of electricity in off-grid regions while enhancing the contribution of renewable energy sources. This is expected to only enhance the connectivity of rural households but will also reduce the negative environmental effects of diesel-fueled power generation (MoE, 2013).

## **2.5 Theoretical Review**

This study utilizes the Agency Theory that deals with the issues of the principal-agent problem which are quite relevant to the majority of ongoing partnership projects. According to Lan & Haracleous (2010), the Agency Theory concept originated from the work of Adolf Augustus Berle and Gardiner Coit Means who were discussing the issues of the agent and principal as early as 1932.

Berle & Means explored the concepts of agency and their applications toward the development of large corporations. They saw how the interests of the directors and managers of a given firm differ from those of the owner of the firm, and used the concepts of agency and principal to explain the origins of those conflicts. They further note that Michael C. Jensen and William Meckling shaped the work of Berle and Means in the context of the risk-sharing research popular in the 1960s and '70s to develop

agency theory as a formal concept. Jensen and Meckling formed a school of thought arguing that corporations are structured to minimize the costs of getting agents to follow the direction and interests of the principals.

Agency theory is a concept that explains why behaviour or decisions vary when exhibited by members of a group. Specifically, it describes the relationship between one party, called the principal, that delegates work to another, called the agent. It explains their differences in behaviour or decisions by noting that the two parties often have different goals and, independent of their respective goals, may have different attitudes toward risk. Agency theory is the study of incentives provided to agents. Incentives are an issue because agents need not have the same interests and goals as the principal. Agency theory focuses on the cost of providing incentives.

An agency, in general terms, is the relationship between two parties, where one is a principal and the other is an agent who represents the principal in transactions with a third party. Agency relationships occur when the principals hire the agent to perform a service on the principals' behalf. Principals commonly delegate decision-making authority to the agents. Agency problems can arise because of inefficiencies and incomplete information.

The theory is also applicable when there is uncertainty. Under uncertain environments, in most business settings, two agency problems such as *adverse selection* and moral hazard may arise. Adverse selection is the condition under which the principal cannot ascertain if

the agent accurately represents his ability to do the work for which he/she is being paid. Moral hazard is the condition under which the principal cannot be sure if the agent has put forth maximal effort to achieve objective of the work being undertaken (Eisenhardt, 2000). The unit of analysis in agency theory is interpreted as the principal-agent contractual relationship as the agent acts in accordance with the principal's advice. Thus agency theory places greater conceptual emphasis on the economic incentives of the contracting parties within the context of the principal-agent relationship (Fama & Jensen, 1998).

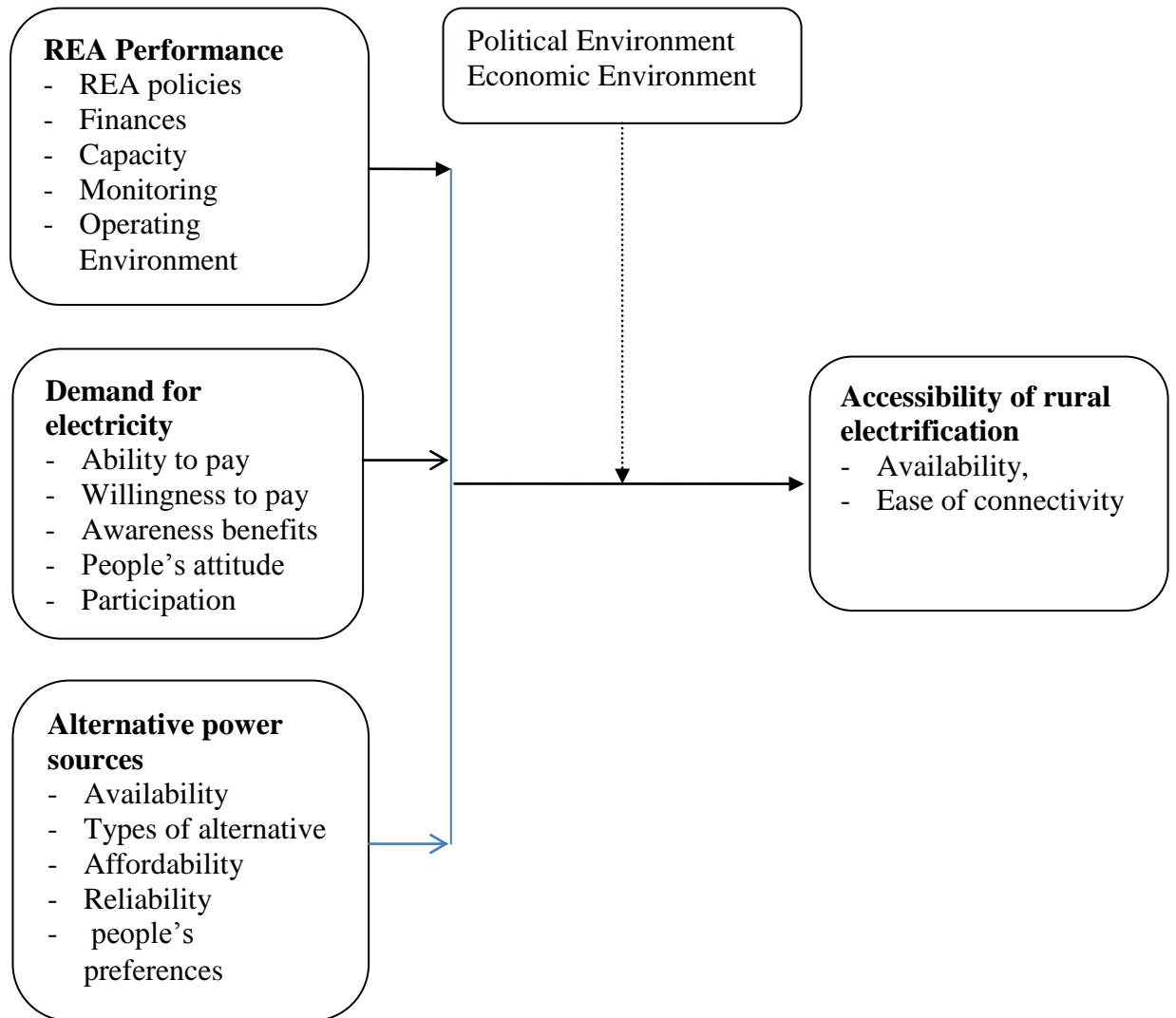
## **2.6 Conceptual Framework**

Figure 2.1 represents the conceptual framework on which the study is based.

**Independent Variables**

**Intervening Variables**

**Dependent Variable**



**Figure 2.1 Conceptual Framework**



## **2.7 Research Gap**

There are a number of studies that have been done on rural electrification in Kenya. One of the studies is on the challenges of implementation of rural electrification projects. The study by Omuoso (2013), perceives rural electrification projects as a corporate strategy by the Kenya Power and Lighting Company. He found that corporate social responsibility was key to the successful implementation of rural electrification projects. The focus of the study has a research gap since it focuses on the national grid alone with no dimension on the alternative power sources. According to his findings, the implementation of rural electrification is pursued as an element of community social responsibility though it is a government policy. The study does not examine alternative power sources that contribute to electricity access in rural areas.

In another study by Mwangi (2014) on the cost of rural electrification, he narrows his research on the supply chain management of the materials in the electrification project of the rural areas. He examines the cost in form of inflation of materials procured by the Kenya Power and Lighting Company. He established that inflation influences the overall cost that is incurred in rural electrification. The study does not provide a critical analysis of the other forms of power generation like solar and the needs assessment of the clients. He looks at power access through Kenya Power and Lighting Company with no comparison with other power sources.

This study therefore was carried out to fill this gap by looking at the factors that affect access of rural electrification in a holistic approach that incorporates the other power sources like solar energy.

## **2.8 Summary**

The review of literature has provided some background information that is relevant to this study, including the factors taken into account when considering the rating of project performance. The literature review has highlighted the issues surrounding rural electrification in Africa and globally, as well as giving some insights on the background of rural electrification in Kenya.

The review has looked at the Agency Theory which fits in the context of this study where REA is seen as the Agent and the Government of Kenya is seen as the principal. Also examined in the review is the supply side of rural electrification, the demand side of electrification and alternative power sources.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter encompasses the research methodology that was used in the field. It focuses on the sources of data and their collection techniques, sampling procedure adopted and tools for data presentation and interpretation. The focus is on the research design, study population, sample and sampling procedure, data collection and data collection procedures, validity and reliability of research instruments and data analysis techniques. It also includes a table showing the operationalisation of variables.

#### **3.2 Research Design**

Research Design is the approach adopted for collecting data in a manner that ensures that the required information is obtained. This study adopted a descriptive survey design. According to Cooper and Schindler (2006), descriptive survey is a study concerned with finding out what, where, and how of a phenomenon. According to Mugenda and Mugenda (2003) descriptive survey is used to obtain information concerning the current status of the phenomena to describe what exists with respect to the variables in a situation, by asking individuals about their perceptions, attitudes, behavior or values.

According to Sekaran (2003) a descriptive study is undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in a situation. Descriptive research design is chosen in this study because it helps describe the state of affairs of the problem under investigation and the relationship between the variables. One of the functions of a research design is to give an assurance on the evidence obtained

and enables the researcher to answer the initial study question (s) as unambiguously as possible.

### 3.3 Target Population

Target population is described by Borg & Grall (2009) as a universal set of study of all members of real or hypothetical set of people, events or objects to which an investigator wishes to generalize the result. Mugenda & Mugenda (2003) argues that the target population should have observable characteristics to which the study intends to generalize the result of the study. The target population of this study was 2,159 as shown on Table 3.1.

**Table 3.1: Distribution of Target Population in Naivasha Constituency**

No.	Respondents	Target Population in Naivasha	Sample Population	Percentage of total population
1.	Households	1,670	167	10
2.	Business community	430	43	10
3	Churches	20	2	10
4	Primary Schools	13	3	23
5	Secondary schools	14	3	21
6	REA management team	12	3	25
	<b>Total</b>	<b>2,159</b>	<b>221</b>	<b>10</b>

### **3.4 Sampling and Sample Size**

The researcher used non-probability sampling method of purposive or judgmental sampling because the sample selection was done based on the nature of the research objectives. Non-probability sampling implies that the sample was chosen due to its relevance to the study topic rather than their 'representativeness', which determines the way in which people to be studied are selected (Neuman, 2006). The sample size is 221 from the total population of 2,159 (about 10% of the study population) as shown in Table 3.1. This sample size is in line with Newman (2006) who states that, for a small population (under 3000), a ratio of about 10% is needed as a representative sample, depending on the topic under research. Purposive sampling approach was used to ensure that a reasonably representative sample is picked for each group. Purposive sampling generally considers the most common characteristics of the type it is desired to sample, tries to figure out where these individuals can be found and tries to study them.

### **3.5 Research Instruments**

The instruments used in this study were two sets of questionnaires, one for REA and one for all the other respondents. The questionnaires were used to collect primary data from the field in the six identified components. The questionnaires were divided into two sections; Part A sought to establish personal details of the respondent and Part B which is based on the specific objectives of the study. The structured questions were used across all the six components so as to facilitate easier analysis.

### **3.5.1 Validity of the Research Instruments**

Validity is the quality of a data gathering instrument that enables it to measure what it is supposed to measure. Creswell (2003) notes that validity is about whether one can draw meaningful and useful inferences from scores on the instrument. To ensure validity, the instruments were reviewed by the research supervisors and other research experts.

### **3.5.2 Reliability of Research Instruments**

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trial. Reliability answers the question “Are scores stable over time when the instrument is administered a second time?” (Creswell, 2003). To ensure reliability, the researcher conducted the test-retest method of assessing reliability. This involved administering the questionnaires to the same group at two different intervals. The reliability coefficient was then calculated to show the relationship between the two sets of scores obtained. A coefficient of 1.00 indicates a complete relationship. However, as the coefficient is affected by the length of time between the two tests, the second test was conducted three weeks after the first test. A coefficient of .80 was obtained, indicating a high degree of reliability.

In addition, a pilot test was carried out to help reveal questions that could be vague and provide an opportunity for the researcher to review them so that they convey the same meaning to all the respondents. Mugenda & Mugenda (2003) suggest that the pilot sample should be 1 to 10% of the study target population, depending on the study population size. The researcher conducted a pilot study for purposes of testing the

questionnaires by randomly selecting 10 respondents, purposively chosen from the total target population of 221, thus leaving 211 respondents for the actual study.

### **3.6 Data Collection Procedure**

After consent was given by the University of Nairobi to collect data, the researcher coordinated data collection process after seeking permission from local authorities. The researcher then engaged three research assistants to assist in data collection. The research assistants were taken through training to clearly understand the research instruments, purpose of the study and ethics of research. The researcher and research assistants administered the questionnaires to the respondents face to face. Local residents were preferred in selecting research assistants who understand the language used mostly in the area to avoid communication barriers.

### **3.7 Data Analysis Techniques and Presentation**

Data collected by questionnaires was first coded. This involved giving all statements numeric codes based on meaning for ease of data capturing. This was followed by data entry and analysis. The data was then analysed using thematic and content analysis which shall paved the way for analysis and hence drawing conclusions based on the findings. The percentage distribution was used and results shown in terms of narrative explanation.

### **3.8 Ethical Considerations**

While conducting the study, the researcher ensured that research ethics were observed. Participation in the study was voluntary. Privacy and confidentiality were observed. The objectives of the study were explained to the respondents with an assurance that the data was needed for academic purpose only.

### 3.9 Operationalisation of Variables

Table 3.2 presents the operationalisation of variables of the study

**Table 3.2: Operationalization of Variables Table**

Objective	Independent Variables	Indicators	Measurement	Measurement scale	Data Collection method	Data Analysis
1. To assess the influence of REA's performance on the accessibility of rural electrification in Kenya	REA's performance	REA policies finances capacity monitoring operating environment	Adequacy of policies; Sources of finances for REPs Adequacy of finances; Capacity of REA; Depth & frequency of monitoring; Application of lesson learning; Suitability or otherwise of REA's external working environment	Interval and Ratio	Questionnaires, interviews and REA reports	Descriptive Statistics and content analysis
2. To determine the influence demand for electricity on the accessibility of rural electrification	Demand for electricity	Residents' ability and willingness to pay, awareness of benefits people's attitude people's participation	People's level of income; Ability to pay People's awareness on the need for power; People's attitude towards power access; People's participation in REPs.	Nominal and Interval	Questionnaires, interviews	Content analysis and frequency distribution tables
3. To determine how alternative power sources influence accessibility rural electrification	Role of alternative sources	Types of alternatives; their availability, affordability reliability people's preferences	What alternatives are available; Are they affordable? Are they reliable? Are people willing to use them	Ordinal and interval	Questionnaires, interviews	Descriptive and content analysis



### **3.10 Summary**

This chapter has explained the approach to be adopted by the researcher in order to obtain the information needed to arrive at meaningful conclusions. It has particularly looked at the research design, the target population as well as data collection and analysis procedures. Ethical considerations have also been brought out and finally the variables have been operationalised in a table.

**CHAPTER FOUR**  
**DATA ANALYSIS, PRESENTATION, INTERPRETATION AND**  
**DISCUSSION**

**4.1 Introduction**

In this chapter, the study presents the findings as captured from the respondents in the field and arranged as per variables. The data is analysed and then presented in the form of tables showing frequencies and percentages and then interpreted. A short discussion on the key findings against relevant literature is also provided.

**4.2 Questionnaire Return Rate**

The questionnaire return rate is as shown in Table 4.1

**Table 4.1: Response Rate**

<b>Response</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Respondents	197	89
No Response	24	11
<b>Total</b>	<b>221</b>	<b>100</b>

From Table 4.1, 89% response rate was realized being far above the 70% that Mugenda and Mugenda (2003) say is an excellent response.

**4.3 Supply side of electricity**

Presented here is data on the supply side of rural electrification, represented by the Rural Electrification Authority. The respondents were asked to comment on the adequacy of

REA policies that govern their projects, as well as their skills . Table 4.2 shows the responses.

**Table 4.2: REA Responses on adequacy of policies and staff skills**

Scale rate	Policies		Skills	
	Number	%	Number	%
Strongly agreed	3	100	3	100
Agreed	-	-	-	-
Disagreed	-	-	-	-
Strongly disagreed	-	-	-	-
Neutral	-	-	-	-
<b>Total</b>	<b>3</b>	<b>100</b>	<b>3</b>	<b>100</b>

All the three respondents, representing 100%, strongly agreed that REA has sound and adequate policies to facilitate their work. This could be linked to the decentralized rural electrification and other initiatives by the Kenya Power and Lightening Company (KPLC), aimed at empowering the rural poor with electricity. In this case, KPLC contracts REPs for the installation of the power before it takes over the actual supply of power to the rural consumers.

On the question of capacity of the REA staff, the respondents agreed that they have the necessary technical skills. This can be attributed to the academic and the field experience in REPs. Majority of staff have the knowledge and skills for executing the mandate. Leadership has been identified as a challenge to the operation of REPs. However, all

respondents agreed that the operating environment is riddled with political interference and patronage. Other challenges may be related to the strict donor community demands and reporting requirements which puts enormous pressure on the project personnel.

Table 4.3 shows the responses received on the question of monitoring as well as the adequacy of funding. Respondents were asked whether monitoring was continuous during the life of the REP and whether funding was adequate.

**Table 4.3: REA Responses on monitoring of projects and adequacy of funding**

Scale rate	Monitoring		Funding	
	Number	%	Number	%
Strongly agreed	-	-	-	-
Agreed		-	-	-
Disagreed	3	100	3	100
Strongly disagreed	-	-	-	-
Neutral	-	-	-	-
<b>Total</b>	<b>3</b>	<b>100</b>	<b>3</b>	<b>100</b>

According to the responses, monitoring is not an integrated and continuous process during the life of the REA projects; instead, whatever monitoring is done takes place at the end of the project and often does not cover sufficient width, breadth and depth with detailed information for decision making.

Regarding the sources of income to finance the projects, 100% of REA respondents were of the opinion that the National Government, through the 5% levy charged to all electricity users across the country, was inadequate income for the REPs. The government contribution is an element of influence through REA. The Government also gets the support of the World Bank that aims to create livelihood opportunities from the rural electrification projects.

In a nutshell, REA has adequate policies to facilitate their work but does not have adequate funding to execute the plans on supplying electricity as demanded. Monitoring of projects is not continuous.

#### **4.3.1 Discussion on the Influence of REA Performance on Accessibility of rural electrification**

This study has established that REA has adequate policies to facilitate its performance on the supply of electricity to communities in Naivasha. However, its efforts were hampered by shortage of funds and also poor monitoring system. The funding is mainly from the World Bank and supplemented by the Government depending on the financial year plans. These funds are always ear-marked for the specific projects with a specified timeframe for completion. The REP officials and policy makers do not engage in resource mobilization from the community. As Renz (2010) argues, the policy makers and personnel at REP do not engage in mobilising the locally available resources but wait upon the donor community to offer the financial support. Thus the income received is not adequate for the operations of REPs. However, one would argue from an economics point of view that resources are always limited but the demand for these resources is

always unlimited, therefore giving rise to the need for prioritisation of the limited resources available and putting them to optimum use for maximum impact. It is also important to engage the community in resource mobilisation given that they are the end users and beneficiaries of rural electrification.

Monitoring was also identified as another area that requires some attention as the study found that the exercise is not continuous in the life of projects. These findings are in line with the BAARS (2006) who states that monitoring is often neglected and thus impacting negatively on the sustainability aspects of the REPs. This is quite unfortunate given that a lot of learning emerges from monitoring of projects and it is this learning that guides decisions regarding any corrective actions required for ongoing projects and also provides important lessons for future projects.

#### **4.4 Demand side of electricity**

This section presents data on demand for electricity at various levels, namely household level, business level, churches and schools.

##### **4.4.1 Demand for electricity**

The respondents were asked whether they agreed with the statement that their level of income played a role in their need for connectivity and their ability to pay. Table 4.4 provides their responses.

**Table: 4.4 Need for Electricity**

Scale rate	Household		Business		Churches		Schools	
	No.	%	No.	%	No.	%	No.	%
Strongly agreed	111	66	40	93	2	100	6	100
Agreed	33	19	-	-	-	-	-	-
Disagreed	-	-	-	-	-	-	-	-
Strongly disagreed	-	-	-	-	-	-	-	-
Neutral	23	15	3	7	-	-	-	-
Total	167	100	43	100	2	100	6	100

As can be seen from Table 4.4, respondents from all four categories were in agreement that indeed, there was great need for electricity connection. Consumption has been increasing rapidly due to the growing number of middle class households. The percentage response can be attributed to the improved income from the flower factories and the booming tourism business, making it possible for households to pay for electricity. These respondents indicated that they have the ability to meet the electricity costs for connection to the national grid. This ability is facilitated by the availability of diverse sources of income, with a significant number of people involved in the informal sector, for example welding, carpentry, plumbing and small scale agriculture, poultry and pig keeping and rabbit rearing. A high percentage, still at 85% of the respondents had a positive attitude towards power access and view it as an element of development.

The business community were of the same view with household respondents that demand for electricity has been on the rise due to consumers' ability to pay. The response was at 93%. It can be associated to the general livelihood opportunities created by the flower factories, hotel industry and the cottage industries that have created opportunities for the Naivasha residents to engage in income generating activities. Majority of the businesses are shop keepers, welding, carpentry and souvenir items that are a major attraction to tourists. Almost all the respondents, at 93%, agreed that they could easily afford the rural electrification connectivity costs. The good income generated from their business enables them to meet the costs of connectivity to the national grid.

All the business community sampled were in agreement that access to power contributes to societal development. The souvenir shops and welding workshops had created a number of employment opportunities for the youth, leading to improved livelihoods for the local population. It can be argued that the availability of power has made some youth to work late in the night, engaging in business activities such as carving souvenir items, carpentry, welding shops, hairdressing salons and barber shops. This can be said to be a more constructive way of using time as opposed to engaging in criminal activities and reckless drinking. It also contributes to the economic development of not only the individual but also the society as a whole. They were of the opinion that electricity creates opportunities for preservation of items like food stuff rather than throwing in the dust bins and it is was helpful for those engaged in business like butchery operation as the refrigerators preserve the meat rather than getting spoilt when it is not completely sold



out to customers. The respondents also did indicate that access to power contributes to the overall development in society.

The respondents were of the view that available economic activities in both formal and informal, had contributed to the improved level of income to the residents, thus enabling them to afford the rural electrification connection costs to the national grid. Among the business community, and those aspiring to begin business, many are motivated by the success of others that are connected to either national grid or other power sources.

The church respondents held a similar view. According to the churches, the access of electricity has been, among other factors, the result of the ability to pay and the government subsidising the costs for the rural beneficiaries. This can be linked to the focus of the community on the available livelihood activities. The respondents were also in agreement with the community and business respondents that the local population generated sufficient incomes from their small businesses. They were also of the opinion that access to power contributes to economic development as it creates employment opportunities in the informal sectors like wielding and shop keeping with refrigerated items like water and sodas.

The school responses also agreed with respondents from the other categories on the need for electricity. All respondents at 100% in both primary and secondary school respondents were in agreement that access to power is based on the ability of

beneficiaries to pay the costs of connectivity to the national grid. If there is no ability to pay, then access to electricity becomes a challenge.

As teachers, they also argued that the connection to power leads to improved performance in schools as they are able to carry out practicals in the laboratories as well as undertake early morning studies. They argue that this in the long run leads to an increase of students passing national examinations and eventually joining higher institutions of learning. This ultimately leads to specialized professionals, thus contributing to overall socio-political and economic development of individuals and society. The community also puts pressure on the school management to ensure that the schools are connected to power in order to enhance performance and competition with other schools.

The respondents agreed with the statement on awareness on the need for power. The awareness on the need for power was created through the Ministry of Education and the various education fora. It is assumed that based on such information, many schools mobilised resources through parents and teachers association (PTA) as well as fundraising.

Over 85% of respondents acknowledge that the rural electrification programme (REP) was established to empower the rural areas across Kenya with to access power at subsidised cost. REA has created awareness through different forums. For example, in schools through the Ministry of Education, school board of management and through

Parents and Teachers Association (PTA). It has also created awareness through local radio FM stations, both print and electronic media regarding the different cost for rural power connection. However, significant number of respondents was of the opinion that REA had done little in creating awareness as a body mandated to implement rural electrification.

#### 4.4.2 Participation in the governance of the REPs

The respondents were asked to state their views on community participation in the governance of REPs. Their responses appear on Table 4.5.

**Table 4.5: Participation in the governance of REPs**

Scale rate	Households		Business		Churches		Schools	
	No.	%	No.	%	No.	%	No.	%
Strongly agreed	-	-						
Agreed	25	14						
Disagreed	130	78	42	95				
Strongly disagreed	-	-			2	100	6	100
Neutral	12	8	1	5				
<b>Total</b>	<b>167</b>	<b>100</b>	<b>43</b>	<b>100</b>	<b>2</b>	<b>100</b>	<b>6</b>	<b>100</b>

As can be seen from Table 4.8, virtually all respondents from all four categories were in agreement that they were not involved in the governance arrangements for the projects.

As the table shows, 78% of the respondents indicated that community participation in the governance of REPs was missing. 14% of the respondents agreed that their adequate

participation in governance ensures successful completion of the projects to improve accessibility of electricity. The response could be linked to a few elites who occasionally give comments to REPs and believe that the rate of completion of projects is based on their contribution. 78% disagreed that there was community participation, and 8% remained neutral.

Business community participation was rated low by 95% of the respondents. This could be linked to the fact that there has never been a formal arrangement in the managing of rural electrification programmes with business entrepreneurs' involvement. According to the respondents, the information regarding the governance of the rural electrification is communicated through the chiefs and assistant chiefs. 5% of the respondents could not tell whether there has been any level of business entrepreneurs' participation in governance. It could be because most of the time, it is the local politicians who raise governance related issues.

The church maintained that the government does not involve the religious institutions and the local population in the governance of rural electrification. They were of the view that decisions are normally communicated through the print media and the local FM radio stations regarding the connectivity to the national grid.

The schools too were of the same opinion as the other respondents that they were not involved in the governance of the REPs. They stated that, although they had been involved in the awareness exercise, they had no information on the governance

arrangements that involved the beneficiaries. On further probing, the respondents were not even aware of the local contact persons for Rural Electrification Authority (REA) and the process for reporting faulty transformers and frequent power blackouts.

#### **4.4.3 Discussion on the Influence of demand for electricity on the accessibility of rural electrification**

The study established that there was consensus on the need for electricity and demand has been on the increase in the overall consumption of electricity. There was also agreement that access to power was based on the ability of beneficiaries to pay the costs of connectivity to the national grid. The increase of rural consumption of electricity has been because of the relatively growing households at the middle class level. The high response can be linked to the improved sources of livelihoods for income generation. The diverse sources of income contribute to the level of capability. Most of the residents are involved in informal sector, for example welding and carpentry and others are employed in the hospitality industry that is the source of their livelihoods. Hand in hand with the above is the positive attitude of the residents towards power as an element of development. Ability to meet the electricity costs for connection to the national grid is one of the factors that influence access to rural electrification.

The study also found that community participation was lacking. This indeed is a significant failure on the part of the project implementers given that even the Constitution of Kenya (2010) also recognizes that participation is a major factor in the sustainability of any project and therefore seeks to enhance the participation of citizens in decision making processes. Participation in decision making processes is recognized as major

contributing factor towards sustainable development. There is consensus among development practitioners that participation by the people affected by a development initiative is in itself a chief end of development. Participation has been known to make projects work better as it enhances ownership of the development intervention and contributes to the project's sustainability. The ownership aspect means that the community view the project as their own and would therefore protect it against vandalism, which is quite a common problem in the case of REPs.

#### **4.5 Alternative power sources**

This section covers the respondents' views regarding the alternative sources of power and their influence on accessibility.

##### **4.5.1 Household responses**

The respondents were asked to comment on their awareness of the availability of other sources of power. Table 4.6 shows the responses.

**Table 4.6: Household responses on awareness of alternative sources of energy**

<b>Scale rate</b>	<b>Awareness</b>	
	<b>Number</b>	<b>%</b>
Strongly agreed	90	54
Agreed	50	30
Disagreed	-	-
Strongly disagreed	-	-
Neutral	27	16
<b>Total</b>	<b>167</b>	<b>100</b>

A majority of respondents at 84% indicated that they were aware of other available power sources in Naivasha apart from the rural electrification. A significant number of respondents cited biogas energy, biomass energy, wood fuel, charcoal, solar and wind as alternative sources of energy.

Respondents were also asked to state their views regarding affordability and reliability of the available alternative power sources. Table 4.7 shows the responses.

**Table 4.7: Household responses on affordability and reliability of alternative power sources**

Scale rate	Affordability		Reliability	
	Number	%	Number	%
Strongly agreed	50	30	120	72
Agreed	90	54	43	26
Disagreed	-	-	-	-
Strongly disagreed	-	-	-	-
Neutral	27	16	4	2
<b>Total</b>	<b>167</b>	<b>100</b>	<b>167</b>	<b>100</b>

Most of the respondents, at 84%, agreed that the alternative sources of energy are relatively cheaper to install compared to the cost of connecting to the national grid. This is most likely linked to the minimal involvement in preparation of alternative source of power compared to the long process of national grid rural electrification that is often politicized and takes a long duration for the actual connection to the grid as the wiring, posts and transformer installation are contracted out to private contractors by the Rural Electrification Authority (REA). Besides the above responses, the expenses are also

linked to the variation in the connection to the national grid on application as it is based on the duration of application after the completion of the REA programme

Regarding the reliability of alternative power sources, almost all the respondents at 98% were in agreement that it is reliable, though dependent on the type of the alternative power source and the usage level. Installation of alternative power at household level was viewed as being less expensive by 163 respondents.

These respondents agreed that people value the benefits of power and always choose the best option that is suited to their needs, whether connection to the national grid or the alternative other power sources. It is important to note that they also all agreed that the type of power connection for individuals depends on the level of income for individuals. The response can be linked to the ability of individuals to pay for the costs related to the installation of power and the usage for power.

#### **4.5.2 Business Community responses**

The respondents were asked to comment on their awareness on the availability of other sources of power. Table 4.8 shows the responses.



**Table 4.8: Business entrepreneurs- awareness of alternative power sources**

<b>Scale rate</b>	<b>Number</b>	<b>%</b>
Strongly agreed	35	81
Agreed	8	19
Disagreed	-	-
Strongly disagreed	-	-
Neutral	-	-
<b>Total</b>	<b>43</b>	<b>100</b>

All respondents under this category were aware of other available power sources in Naivasha besides the rural electrification programmes. The 100% response could be linked to the basic research of the business individuals and firms on the various types of power sources that can be suitable to their needs. This gives them a wide range of information on sources of power.

Table 4.9 shows the responses obtained when respondents were asked to comment on the affordability of alternative types of power sources.

**Table 4.9: Business entrepreneurs responses on affordability of alternative power sources**

<b>Scale rate</b>	<b>Number</b>	<b>%</b>
Strongly agreed	39	90
Agreed	2	5
Disagreed	-	-
Strongly disagreed	-	-
Neutral	2	5
<b>Total</b>	<b>43</b>	<b>100</b>

As presented in table above, 5% of the respondents were neutral regarding the cost for installation of alternative power sources compared to the cost of connecting to the national grid. The response is based on the various interests that can be realised based on the type of power connection. As an example, the commercial firms that engage in horticulture need a source of energy that is able to meet plantation farming. Such firms may opt for most reliable solar panels and diesel engine generators that are able to manage commercial irrigation of the firms.

Table 4.10 shows the responses obtained when respondents were asked to comment on the reliability of alternative types of power sources.

**Table 4.10: Business entrepreneurs responses on reliability of alternative power sources**

<b>Scale rate</b>	<b>Number</b>	<b>%</b>
Strongly agreed	-	-
Agreed	42	98
Disagreed	-	-
Strongly disagreed	-	-
Neutral	1	2
<b>Total</b>	<b>43</b>	<b>100</b>

Majority of respondents (98%) agreed that it was more reliable compared to the rural electrification programme as they are directly responsible for the operation of such sources of energy, for examples doing repairs and replacement of solar equipment rather than REA programmes where consumers have no control of power supply and the power failures often caused by vandalism of transformers and siphoning of oil as is common in this and other areas.

Almost all respondents agreed just like at the household level that the interest of the business community is on the optimal benefits that the alternative source of power will yield. The 98% response is based on the need in line with the cost benefit analysis for each power source. All these are based on the level of income for the business and the ability to maintain the connection of power while getting the maximum returns on the business venture.

### **4.5.3 Church response**

The church responses resonated with those of the business community, indicating that they were well informed of other available power sources. The responses can be as a result of the use of other alternative sources of power like the diesel engine generators prior to the connection to national grid of the REPs. To the church, just like the household respondents in Table 4.11, the cost for alternative source of power besides the REPs is lower, especially at the initial stage of the establishment of the church with meagre financial resources. The power is required mostly on Sundays and occasionally on other day in the course of the week for the overnight prayers.

On reliability, the church were in agreement that alternative power was the most reliable source compared to REPs. It was easy for the church to access power from other sources other than REPs. They greatly relied on the other power sources which they found more convenient and more reliable. According to the church respondents, other sources of power provided an alternative that readily meets their needs and level of income.

### **4.5.4 Schools response**

The schools responses on the alternative sources of power was same as the business community in table 4.11 regarding the level of awareness of other sources of power and the related costs for installation. According to the schools' respondents, these sources are relatively cheaper, depending on the type of the alternative power preferred. The schools respondents were neutral on the aspect of reliability of the alternative power sources. This response can be attributed to the fact that the reliability can be measured in line with the use of power. It then becomes relative to the interests of the consumer.

Respondents across all categories agreed on sufficient awareness on the alternative source of power and were neutral regarding cost for installation. They all agreed that it was reliable but based on the need for the power.

#### **4.5.5 Discussion on the influence of alternative power sources on accessibility to rural electrification**

The study found that majority of Naivasha residents were aware of the alternative sources of energy such as solar and biogas. However, their use was dependent on cost and individual preferences by the businesses as well as household needs. Their reliability also depends on the specific type of alternative power energy that is adopted by the individuals and the business community. The alternative power sources are also seen as being relatively cheaper compared with connecting to the national grid, but this again is dependent on individual use and need as well as the type of alternative. This finding agrees with Borg (2009) in his argument that the cost for standard solar panel is about KSh.5,000 and the rechargeable battery at the same cost with wiring and installation at KSh.2,000. This makes it far cheaper than the REA programme that takes between KSh.25,000 to 35,000 for 600 metres from the transformer. This is based on the time of application from the completion of then REA programme. It can be said alternative power sources do offer cheaper and viable options for those who cannot afford grid connection but even for those who can afford, people still use these alternatives as back-up systems when there are grid power outages. It also not uncommon these days to find that people use grid power for lighting but prefer to use solar for heating as this arrangement turns out to be cheaper. The popularity of alternative sources is also gaining currency globally with initiatives like the SE4ALL that aims to ensure universal access to

modern energy services while doubling the share of renewable energy in the global energy market. SE4ALL, a consortium of governments, businesses, banks and other international institutions, plans to double the rate of improvement in energy efficiency worldwide. This is in recognition of the fact that renewable energy offers the solution to the negative environmental impacts caused by fossil fuelled energy.

#### **4.6 Summary**

This chapter has presented the study findings for each of the six categories under the three variables. The findings were also analysed and interpreted. A short discussion on the key findings has also been presented.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter offers a summary of the findings arranged per objective. The chapter also gives a conclusion of the entire study before giving recommendations and suggestions for further research

#### **5.2 Summary of Findings**

The following are the findings of the study

##### **5.2.1 Influence of REA Policies on Accessibility of rural electrification**

This study established that although REA has adequate policies to facilitate their work, the Authority did not have adequate funding to execute the plans on supplying electricity as demanded. The funding is mainly from the World Bank and supplemented by the Government. There are no efforts to engage in resource mobilization from the community. There was also inadequate monitoring of the projects.

##### **5.2.2 Influence of demand for electricity on the accessibility of rural electrification**

The study established that the demand electricity consumption in Naivasha has been increasing rapidly due to the increasing number of middle class households whose improved income arise mainly from the booming flower industry and tourism business in the region. Access to power is based on the ability of beneficiaries to pay the costs of connectivity to the national grid. However, the study also found that community was not

involved in the governance and decision making processes with regard to the rural electrification projects.

### **5.2.3 Influence of alternative power sources on accessibility of rural electrification**

The study established that majority of Naivasha residents were aware of alternative sources of energy that included solar and biogas. These alternative sources of energy are relatively cheaper to install compared to the cost of connecting to the national grid. The use of these alternative sources was dependent on cost and individual preferences by the businesses as well as household needs. Their reliability also depends on the specific type of alternative power energy that is adopted by the individuals and the business community.

### **5.3 Conclusion**

Accessibility of rural electrification is to a great extent achieved based on the ability to pay for the connectivity costs. The ability to pay is largely dependent on the level of incomes among the residents. The individual financial status and personal preference inform decisions on the choice between connecting to the national grid through the rural electrification projects or using alternative power sources. The availability and awareness of these alternative sources means a reduced demand for connection to the national grid which may be considered relatively expensive in comparison, but this again depends on the use for which power is required. Also the reliability of the alternative sources far exceeds the grid connection which suffers frequent outages.



To a large extent, the demand for electricity is instrumental at influencing accessibility to electrification. This is because those with a pressing need for it will acquire it through the available means, either through grid connection by the REA, or use of alternatives. On the other hand, the REA as the supply side is key in that no grid connection can take place without their involvement. It can therefore be said that the three variables interact to influence the accessibility of rural electrification.

However, it is also worth noting that although there has been substantial progress in enhancing rural electrification in terms of provision of funding and having adequate policies to guide the work of the REA, a lot more requires to be done in terms of identifying additional sources of funding, improving community participation and monitoring of projects.

#### **5.4 Recommendations**

##### **The following are the recommendations of the study**

1. To improve public perception of REA and to motivate the communities to apply for power connection, the REA should ensure that its employees are skilled and knowledgeable on community mobilisation and public relations.
2. In order to create a sense of ownership and ensure sustainability of the REPs, project implementers need to build in community participation in their project designs, implementation and other decision-making processes.
3. To be able to implement effective and sustainable projects that are evidence-based, rural electrification project implementers also need to ensure that

monitoring is an integral part of their projects and that lessons learnt are properly documented and used to inform future projects.

4. The government also needs to support and provide incentives for investments in alternative power sources. These need to be seen as complementing REA's efforts to improve and increase accessibility while at the same time promoting the use of renewable energy as opposed to fossil generated electricity.

### **5.5 Suggestions for further Research**

The following are suggestions for future research.

1. The role of private public partnerships in rural electrification.
2. The role of national and county politics in influencing rural electrification.

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**APPENDICES**  
**APPENDIX I**  
**QUESTIONNAIRE 1 (FOR REA)**

Good morning/ afternoon,

I am conducting a research on rural electrification in Kenya and would be very grateful if you could please respond to the questions in this questionnaire. The questionnaire is administered for the purpose of collecting data on rural electrification in Kenya for academic purpose only. Any information given shall be held in confidence and not used for any other objective contrary to the stated purpose.

**(A) General information**

1. Please indicate your position at the REA.....

1. What is your highest level of education?

Post Graduate [ ] Graduate [ ] Undergraduate [ ] Diploma

[ ]

Any other (specify).....

2. Kindly indicate your level of agreement with the following statements, on a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5- strongly agree.

<b>Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
REA has sound policies that are adequate to support and facilitate its performance on rural electrification.					
REA has several different sources of income to finance its projects.					
Income received by REA is adequate for its operations					
Most electrification projects have difficulties in finding					

sufficient, appropriate and continuous funding for their work					
Monitoring is continuous during the life of REPs					
Monitoring covers sufficient width, breadth and depth to generate useful information for decision making					
Findings and lessons from monitoring are used to respond to emerging issues and applied in designing future programmes					
REA has the necessary technical capacity and skills to carry out its mandate					
Weak capacity of leadership, governance and technical areas of development are some of the areas identified as challenges to project completion					
REA enjoys the support of GoK, through the energy ministry, to provide effective services to its customers					
Interference of local politicians and civic leaders is a major hindrance to rural electrification					



**APPENDIX II**  
**QUESTIONNAIRE 2 (FOR USERS)**

Good morning/ afternoon,

I am conducting a research on rural electrification in Kenya and would be very grateful if you could please respond to the questions in this questionnaire. The questionnaire is administered for the purpose of collecting data on rural electrification in Kenya for academic purpose only. Any information given shall be held in confidence and not used for any other objective contrary to the stated purpose.

**(A) General information**

1. Tick the name of the group you belong to

(a) Household [  ]

(b) Business [  ]

(c) Churches [  ]

(d) Primary Schools [  ]

(e) Secondary Schools [  ]

2. Position at the above group.....

3. What is your highest level of education?

Post Graduate [  ] Graduate [  ] Undergraduate [  ] Diploma  
[  ]

Any other (specify).....

**PART I: Demand for Electricity**

4. Kindly indicate your level of agreement with the following statement related to demand for electricity and its influence on electricity access. Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5- strongly agree.

<b>Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
People’s level of income is a major factor that influences electricity access and their ability to pay for the service					
Residents have sufficient incomes from diverse sources to facilitate connectivity to the national grid					
There is adequate awareness on the need for power (eg for lighting, powering radios/TVs, charging phones and running businesses)					
People have a positive attitude towards power access and see it as part of development					
There is adequate community participation in the governance of REPs to ensure successful completion of projects					

**PART II: Alternative Power Sources**

5. Indicate your level of agreement with the following statement related to alternative sources of power and their influence on accessibility. Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5-strongly agree.

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
There is sufficient awareness of other available power sources in Naivasha apart from rural electrification					

These alternatives are cheaper to install compared to the cost of connecting to the national grid					
Compared to rural electrification, the alternative sources are more reliable					
Alternative sources of electricity are more expensive to install compared to rural electrification connection					
People generally appreciate the benefits of power and will chose the option best suited to their needs, whether connection to the grid or other sources.					
The type of power source used depends on individuals' level of income					

6. To what extent do the alternative power sources influence electricity access?

- To a very low extent                    [   ]                    To a low extent                    [   ]  
 To a moderate extent                    [   ]                    To a great extent                    [   ]  
 To a very great extent                    [   ]

**THANK YOU FOR YOUR PARTICIPATION**

**APPENDIX III**  
**LETTER FROM THE UNIVERSITY OF NAIROBI**



**UNIVERSITY OF NAIROBI**  
COLLEGE OF EDUCATION AND EXTERNAL STUDIES  
SCHOOL OF CONTINUING AND DISTANCE EDUCATION  
DEPARTMENT OF EXTRA-MURAL STUDIES  
NAIROBI EXTRA-MURAL CENTRE

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

Main Campus  
Gandhi Wing, Ground Floor  
P.O. Box 30197  
N A I R O B I

27<sup>th</sup> October, 2014

REF: UON/CEES//NEMC/19/274

**TO WHOM IT MAY CONCERN**

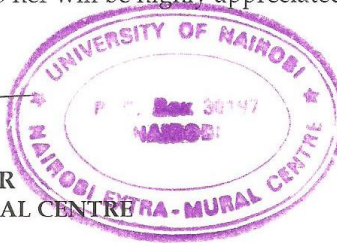
RE: ELIZABETH MWIHAKI - REG. NO L50/72062/2011

This is to confirm that the above named is a student at the University of Nairobi College of Education and External Studies, School of Continuing and Distance Education, Department of Extra- Mural Studies pursuing Master of Arts in Project Planning and Management.

She is proceeding for research entitled "factors influencing accessibility of rural electrification in Kenya:" A case of Naivasha Constituency.

Any assistance given to her will be highly appreciated.

  
CAREN AWILLY  
CENTRE ORGANIZER  
NAIROBI EXTRA MURAL CENTRE



**APPENDIX IV**  
**RESEARCH AUTHORIZATION LETTER**



**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,  
2241349, 310571, 2219420  
Fax: +254-20-318245, 318249  
Email: secretary@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref: No.

Date:

**10<sup>th</sup> July, 2015**

**NACOSTI/P/15/0239/3989**

Elizabeth Mwihaki Dufe  
University of Nairobi  
P.O. Box 30197-00100  
**NAIROBI.**

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on “*Factors influencing accessibility of rural electrification in Kenya: A case of Naivasha Constituency,*” I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for a period ending **6<sup>th</sup> November, 2015.**

You are advised to report to **the County Commissioner and the County Director of Education, Nakuru County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

  
**DR. S. K. LANGAT, OGW**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Nakuru County.

The County Director of Education  
Nakuru County.

*National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified*


APPENDIX V  
RESEARCH PERMIT

**THIS IS TO CERTIFY THAT:**  
**MS. ELIZABETH MWIHAKI DUFE**  
**of UNIVERSITY OF NAIROBI, 0-100**  
**Nairobi, has been permitted to conduct**  
**research in Nakuru County**

**on the topic: FACTORS INFLUENCING**  
**ACCESSIBILITY OF RURAL**  
**ELECTRIFICATION IN KENYA: A CASE OF**  
**NAIVASHA CONSTITUENCY**

**for the period ending:**  
**6th November, 2015**

**Permit No : NACOSTI/P/15/0239/3989**  
**Date Of Issue : 10th July, 2015**  
**Fee Received :Ksh 1,000**




**Applicant's Signature**

**Director General**  
**National Commission for Science,**  
**Technology & Innovation**

**CONDITIONS**

- 1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.**
- 2. Government Officers will not be interviewed without prior appointment.**
- 3. No questionnaire will be used unless it has been approved.**
- 4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**
- 5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.**
- 6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.**

**REPUBLIC OF KENYA**



**NACOSTI**  
**National Commission for Science,**  
**Technology and Innovation**

**RESEARCH CLEARANCE PERMIT**

**Serial No. A 5746**

**CONDITIONS: see back page**